

Appl. No.: 10/632,359
Reply to Office Action of: 05/05/2006

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REMARKS

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Claims 1-5, 7, 9, 11, 15 and 17 were rejected under 35 U.S.C. §102(b) as being anticipated by Kawai et al. (JP 08029202). Claims 14, 16, 18 and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamada (US 6,351,657) in view of Kawai et al. (JP 08029202). Claim 13 was rejected under 35 U.S.C. §103(a) as being unpatentable over Kawai et al. (JP 08029202). The examiner is requested to reconsider these rejections.

Embodiments of the invention provide a motion encoder for determining rotational movement of a rotatable member. In one embodiment, (Fig. 2) a disc has regions with three different reflective characteristics (very reflective; partially reflective; non-reflective). The reflection characteristic can be detected by reflecting a beam off the surface. The use of more than two reflection characteristics creates a directionally unique sequence around the disc, so that the direction of movement of the disc can be identified.

Independent claim 3 requires the detector to be located for rotation with the rotatable member.

Independent claim 4 requires the source to be located for rotation with the rotatable member.

Independent claim 17 requires the element to be used in transmission.

Claim 3 includes the requirement that "the detector is located for rotation with the rotatable member". Claim 4 includes the requirement that "the source is located for rotation with the

Appl. No.: 10/632,359
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rotatable member". In paragraph 2 of the action, the Examiner appears to argue that Fig. 2 of Kawai shows a detector located for rotation with a rotatable member, and a source located for rotation with a rotatable member because "in Fig. 2, elements 2-4 are coupled via a shaft". The Examiner is not correctly interpreting the disclosure of Kawai in this respect, as can be understood from a consideration of the manner in which the Kawai device will operate.

The following references to Kawai are references to the machine translation. The Examiner refers to Fig. 2 of Kawai. Fig. 2 is a perspective view (paragraph 0009) and Fig. 3 is a sectional view (same paragraph). Item 2 is an optical disc and the rotary encoder has "basic intelligence which gives own angle of rotation of an optical disc". Again, in paragraph 0018, there is reference to "rotation of an optical disc 2" and the "angle of rotation of an optical disc 2". It is clear that in the Kawai device, the optical disc 2 will rotate, in use. It is for this reason that it is provided with a shaft. The shaft (un-numbered in Fig. 3) extends slightly beyond the optical disc 2, toward the "light receiving head 4", but does not reach the head 4 (see Fig. 3). The extension of the shaft, beyond the disc 2, is visible in Fig. 2, but the viewing angle of Fig. 2 is not appropriate to reveal that the shaft does not reach the head 4. This is clear from Fig. 3. The Examiner should also note that in Fig. 1, the shaft extends from the disc 2 to the driving means 3, but does not extend from the disc 2 to the head 4. It is, therefore, clear from the drawings (particularly Figs. 1 and 3) that the

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Examiner is not correct in asserting that elements 2-4 (the disc 2 and the head 4) are coupled via a shaft.

The head 4 of Kawai includes the source (the "stage which irradiates light energy on the front face of an optical disc 2") and the detector, ("a light-receiving means to receive said light energy reflected from the optical disc 2") - see paragraph 0010. Accordingly, neither the detector nor the source in Kawai is coupled via a shaft with the optical disc 2. There is no other disclosure of any connection between the detector or source and the disc 2.

Accordingly, Kawai does not disclose "the detector is located for rotation with the rotatable member" and, thus, claim 3 is novel over Kawai. Kawai does not disclose "the source is located for rotation with the rotatable member" and, thus, claim 4 is novel over Kawai.

Kawai does not contain any teaching which suggests these features. Indeed, Kawai clearly teaches away from using these features. This can be seen from an understanding of how Kawai functions. Kawai describes that "the beam spot condensed from the optical head 4 is irradiated, and the reflected light which had three different reflection factors in the third truck 9 is detected by the light-receiving means 40" (paragraph 0020). He then explains that "while an optical disc 2 goes around, the change of a reflection factor arises". It is clear that if the optical head 4 was coupled to the optical disc 2, so that the optical head rotated with the optical disc, there would be no relative movement between the

Appl. No.: 10/632,359
Reply to Office Action of: 05/05/2006

head 4 and the disc 2 and there would be no mechanism for changing the reflection factor on which Kawai relies.

Accordingly, Kawai makes clear that rotation of the detector or source with the rotatable member cannot be used in the Kawai device and thus teaches away from the present invention.

An advantage of the embodiments of the present invention, as set forth in claims 3 and 4, is to allow relative movement to be achieved by rotation of the detector or source, respectively, thus allowing the "element" to remain stationary.

Turning to claim 17, basis for the amendment is in the penultimate paragraph of the description. The amended claim is novel over Kawai. Kawai describes (paragraph 0026) "using the transparency type optical disc which used the slit". An optical disc with a slit will either transmit or block transmission. The result is a simple binary sequence of "on" and "off" when the disc turns. This cannot provide "a directionally unique sequence of transmission characteristics", as required by amended claim 17. For this reason, paragraph 0026 is contradictory in relation to the rest of Kawai, because an "optical disc which used the slit" prevents the movement being "judged as right-handed rotation" or "judged as left-handed rotation" (paragraph 0021).

Kawai only discloses the "optical disc which used the slit". Kawai does not disclose a rotatable member which "comprises ... a plurality of electromagnetic radiation affecting surfaces having respectively different opacities to electromagnetic radiation for affecting transmission ... from the source to the

Appl. No.: 10/632,359
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detector", as required by amended claim 17. Accordingly, amended claim 17 is novel over the disclosure of Kawai. Kawai does not contain any teaching which would suggest the use of different opacities to the skilled reader. The only reference to transmission is the anomalous paragraph 0026, referring to the "optical disc which used the slit". However, it is clear, as noted above, that there is an internal contradiction between what is described in paragraph 0026 and what is described elsewhere in the Kawai document. The internal anomaly represented by paragraph 0026, and the evident after-thought nature of that paragraph, would be sufficient to prevent the skilled reader using paragraph 0026 to contradict the teaching of the rest of the document, or to teach anything beyond it. Accordingly, the teaching of Kawai does not render obvious the scope of amended claim 17.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issue remain, the examiner is invited to call applicants' attorney at the telephone number indicated below.

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HARRINGTON & SMITH

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Respectfully submitted,

Mark F. Harrington
Mark F. Harrington (Reg. No. 31,686)

7/5/06

Date

Customer No.: 29683
Harrington & Smith, LLP
4 Research Drive
Shelton, CT 06484-6212
203-925-9400

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